GUIDELINES FOR THE DESIGN OF WATER SUPPLY SYSTEMS FOR SMALL RESIDENTIAL DEVELOPMENTS

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SPECIAL ENGINEERING, DESIGN AND EQUIPMENT
ENVIRONMENTAL APPROVALS AND PROJECT ENGINEERING BRANCH

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TABLE OF CONTENTS

FORWARD

The initial version of these guidelines was prepared by a committee of Provincial and Municipal Engineers who were familiar with current practice within the Province of Ontario with respect to small residential groundwater supply systems and was entitled, "Recommended Guidelines for Small Groundwater Supply Systems for Residential Developments".

Staff of the Environmental Approvals and Project Engineering Branch, the Ministry of the Environment, initiated a review of and revisions to the original guideline. The resulting guideline has eliminated any conflicts with other MOE guidelines and been expanded to include surface water sources.

It is recognized that conditions differ significantly from municipality to municipality and that strict adherence to these guidelines may not always be possible. Therefore, it is intended that these guidelines outline acceptable levels of servicing to assist consulting engineers, municipal engineering staff and other designers in the preparation of designs and applications that will meet the approval requirements of the Ministry of the Environment.

It should be noted that other approval authorities, such as the municipality which the works will be constructed, may have servicing standards that exceed the requirements of these guidelines. The designer should, therefore, ensure that he is aware of the requirements of all other approving authorities prior to making an application to the Ministry of the Environment.

As a final point, it must be emphasized that this document contains design guidelines. These should not be confused with standards or regulations which must be absolutely complied with in order to obtain a certificate of approval. It is not the intention of the Ministry of the Environment to stifle innovation. Whenever a designer can demonstrate that environmental and/or health conditions can be safeguarded by alternative approaches, such alternatives will be considered for approval.

1.0 GENERAL

1.1 For the purposes of this guideline a small water supply system or "minor" water supply system is defined as one which is designed to serve a population equivalent of less than 500 persons.

1.2 The decision as to when these communal water supply guidelines should be applied, should be decided by the municipality and/or regulatory agency. However, the following recommendations are provided for guidance:

a) Where an excess of ten residential lots or dwelling units are to be developed or exist and the average lot size is less than 0.8 hectares, a communal water supply system should be provided providing local conditions are favourable to the development of a suitable/ acceptable ground or surface water supply.

b) Where in the case of a new subdivision, the lot size is to be 0.8 hectares or greater, individual wells may be allowed, unless the subdivision is located within or adjacent to a hamlet or settlement which may be provided with municipal supply in the future. In this case, as a minimum, watermains complete with house connections shall be provided at the time of installation of other services. It shall be the decision of the municipality as to whether a communal water supply shall be provided in the interim or whether private wells will be allowed.

1.3 The decision as to whether or not fire protection will be provided via the communal water supply system

is a municipal responsibility. In deciding upon the need for such protection the municipality should consider such factors as:

a) The availability of adequate supply of water;

b) The additional capital and operating costs associated with such a system;

c) The availability of an adequate fire department, fire service communication and fire safety control facility;

d) Alternatives to a piped communal fire facility such as residential sprinkler systems.

Guidelines and advice respecting fire protection can be obtained from;

a) Insurers Advisory Organization
Fire Underwriters' Survey,
180 Dundas Street West,
Toronto, Ontario.
M5G 1Z9 (416) 597-1200

b) Ministry of the Solicitor General/Office of the Fire Marshall Public Safety Division,
590 Keele Street,
Toronto, Ontario.
M6N 4X2 (416) 965-4848

1.4 Approval of all water supply and distribution plans and specifications must be obtained from the Ontario Ministry of the Environment prior to construction.

To aid in the obtaining of such an approval reference should be made to the Ministry's publication entitled "A Guide on Applying for the Approval of Water Works".

2.0 DOMESTIC WATER REQUIREMENTS

2.1.1 Water use in small population centres/ subdivisions can be divided into the following sectors:

i) Household use, i.e., bathing, cooking, laundering, disposal of sanitary wastes.

ii) Outdoor use, garden and lawn irrigation, car washing, ornamental fountains, etc.

iii) Fire protection.

2.1.2 Average daily domestic consumption rates can vary from less than 180 L/c.d to more than a 1,500 L/c.d. These values represent the average flow over a 24 hour period and do not reflect the fact that there are maximum day and peak hour/instantaneous demands in the system each day which will exceed the average value by a significant amount. It is essential that the source of supply and the distribution system be capable of meeting these maximum and peak demand rates without overtaxing the source or resulting in excessive pressure loss in the distribution system.

2.1.3 Numerous studies have been undertaken in an attempt to establish the ratio between these average flows and the maximum and peak/ instantaneous rates. These studies have shown conclusively that small systems have a higher percentage maximum and peak demand rate than large systems, with rates as high as 15 times average.

2.1.4 Table I provides a summary of typical average domestic water use by type of establishment. Figure I contains a plot of number of dwelling units service vs. peak/instantaneous demand. Table I and Figure I have been adapted from those contained in the AWWA "Design and Construction of Small Water Systems - A Guide for Managers" and the Division of Sanitary Engineering, New York State Health Department "The Design of Small Water Systems" respectively. The values presented do not include an allowance for lawn watering.

2.1.5 The average domestic flow for a proposed service area should be calculated using the appropriate unit flow value(s) from Table I. As previously noted, these value(s) are the average flow over a 24 hour period. The maximum daily flow (i.e. the minimum flow for which the source of supply should be developed) should be calculated on the assumption that the average daily flow occurs over an eight (8) hour period. That is, a maximum day factor of three (3) times average day should be used.

2.1.6 The peak hourly/instantaneous demand rate should be determined by multiplying the average daily flow by the appropriate rate factor taken from Figure I.

2.1.7 As noted in the preceding clauses these flow figures are for domestic flows only and do not include allowances for lawn watering or fire protection. Where lawn watering and/or fire protection are to be provided via the communal water supply and distribution facility, these flows will generally be provided through a water storage facility.

2.2 The number of persons occupying a particular type of housing unit will vary from population centre to population centre. Where the proposed service area involves an existing established population centre, an actual house count/population determination should be undertaken complete with an assessment as to the existence of vacant developable lots which would front or reasonably be connected to the system via extensions at some time in the future.

Where the proposed service area does not exist (i.e., plan of subdivision) reference should be made to similar types of development; the "Municipal Directory" etc. in order to permit a population determination. In the absence of such information however, the following is provided for guidance:

Type of Unit	Occupants/Units
Single Family	3.6
Semi-Detached	3.8
Duplex	3.8
Triplex	3.8
Townhouse	3.8
Apartment	2.8

2.3 The applicant (i.e., developer, consulting engineer, etc.) shall be responsible for the required application to the Ontario Ministry of the Environment for a Permit to Take Water where the daily withdrawal rate will exceed 50 m^3/d. The applicant shall be responsible for all conditions imposed by the Ministry in the Permit including compensation to other persons should the taking of water interfere with another persons interest in the water.

2.4 Where two service areas containing communal systems abut, interconnection of the distribution systems with a suitable operating agreement between the respective owners/operators may be allowed.

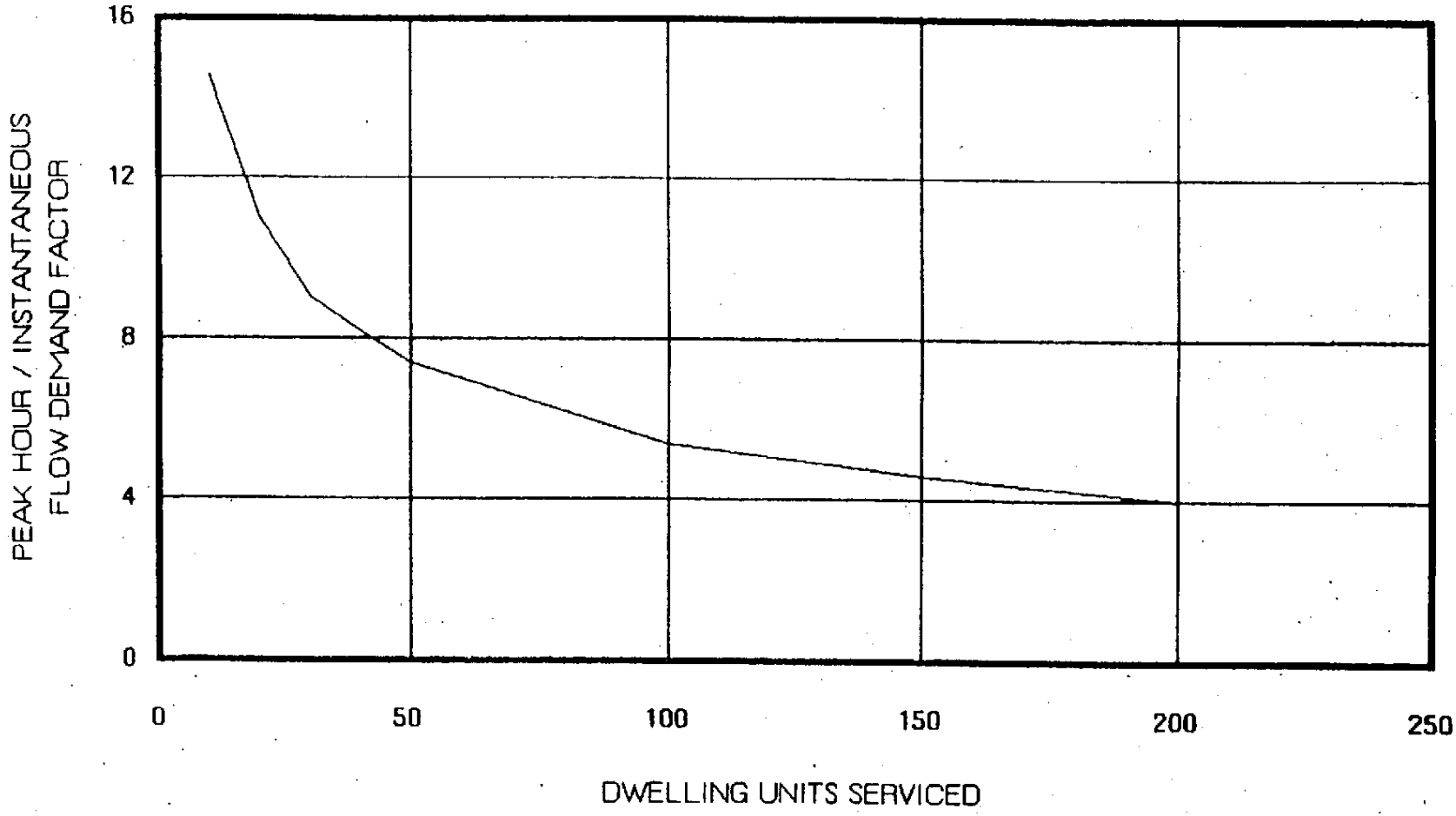
2.5 In some instances, particularly new development, it may be desirable to phase the construction of the water supply and distribution facilities over a period of time. Such phasing is acceptable to the Ministry providing the proponent is able to satisfy the Ministry that:

a) The proponent has title to all lands necessary for the construction of future phases;

b) The initial design and construction is such as to permit the construction of the future phases without interruption of service to the preceding phases; and,

c) The proposed source of supply has the potential to sustain the ultimate water supply requirement. In this regard it should be noted that any Permit-To-Take-Water issued by the Ministry for the source of supply may have conditions attached to it.

FIGURE 1



NOTE

HORIZONTAL SCALE 1:30

VERTICAL SCALE 1:40

TABLE I
(Excluding lawn watering)
GUIDE FOR WATER USE

Type of Establishment	Water Used (L/day)
Camp:	
Construction, semi-permanent (per worker)	190
Dwelling:	
Boardinghouse (per boarder)	190
Luxury (per person)	380-570
Multiple-Family Apartment (per resident)	150
Roominghouse (per resident)	225
Single family (per resident)	190-285
Estate (per resident)	380-570

3.0 WATER SUPPLY AND STORAGE REQUIREMENTS

3.1 As a minimum the water supply facility should be designed to meet the projected maximum daily flow requirement of the service area with peak hourly, lawn watering and fire demands met from storage. Where it is possible to develop the source of supply to meet more than the projected maximum daily flow, this is acceptable and the required storage volume can be reduced accordingly.

3.2 When treatment of the water is required in order to meet the Ministry's Drinking Water Objectives the capacity of the treatment units should be increased by 5% in order to allow for in-plant uses such as filter backwashing, clarifier/settling tank blowdown, service water, etc.

3.3 Whether or not fire protection is required is a municipal decision. If the municipality has decided that fire protection is not to be provided and the source is only capable of the maximum day, the minimum effective storage to be provided shall be the average daily flow. To this minimum value must be added the appropriate allowances for lawn watering (0.31 L/s per 93 m^2 for 1 hour); disinfection (as per MOE "Chlorination of Potable Water Supplies/65-W-4"); and, in-plant process requirements (when treatment required) as the individual proposal may require.

3.4 Where it has been decided that fire protection is to be provided via the communal water supply and distribution system the minimum volume of the storage facility should be increased by an amount equal to a fire flow of 16.6 L/s for 2 hours. This flow is the

minimum recognized by the Insurers Advisory Organization - Fire Underwriters Survey for the purposes of rating. It is strongly recommended by the Ministry that discussions be held with both the Fire Underwriters Survey and the Office of the Fire Marshall respecting fire protection if the decision is made to provide fire protection via the communal system.

3.5 - For discussion respecting the design/layout of water storage facilities, reference should be made to the MOE publication entitled "Guidelines for the Design of Water Storage Facilities".

4.0 LOW LIFT PUMPING EQUIPMENT

4.1 When it is necessary that the raw water be subjected to treatment, low lift raw water pumps will generally but not always be required to pump the raw water from the source to the treatment facility. When low lift pumps are provided on a surface water source a minimum of two units, each capable of the design flow, should be provided.

4.2 Pumping of the raw water from the source to the treatment units should be accomplished via a submersible or vertical turbine pump. Operation of the low lift raw water pumps should be regulated by the utilization of high and low water level sensing devices located in the treated water storage reservoir. (The sensing devices should not contain mercury.)

4.3 Suitable control shall be provided for the low lift raw water pumps to operate each singly or together on automatic or manual modes.

4.4 In instances where a groundwater supply is to be utilized and this supply has been proven to be free of hazardous bacterial or viral contamination but still requires protective disinfection, provision should be made for a temporary direct connection between the low lift water pumps and the distribution system. This connection should be completed by a length of high pressure hose such that in the event of failure of the high lift pumping facility, it will be possible to maintain, albeit at a substantially reduced head, water service via the temporary connection. Under no circumstances should any form of by-pass capability between a low lift raw water pumping facility and a distribution system be provided when a surface water source is utilized as the source of supply.

4.5 The design of the low lift raw water pumping station discharge piping should be such as to minimize the number of high points. Any high points in the piping system should be equipped with a manually operated air relief valve which has been suitably threaded to permit the future installation of an automatic valve should this be found necessary.

4.6 Where treatment is required, the low lift/raw water pumps should be controlled such that the discharge rate to the treatment units does not exceed the capacity of the treatment unit(s) remaining in operation during backwashing. This can be accomplished by either providing sufficient additional storage at the treatment plant to permit complete shut-down of all treatment units during the backwash cycle or installing a rate-of-flow controller on the low lift pump discharge which throttles/limits flow to the treatment unit to a capacity equal to that of the unit remaining in service. In either case, the controls should be connected to the backwash pump cycle for automatic activation.

5.0 HIGH LIFT PUMPING EQUIPMENT

5.1 Where water treatment is to be provided, at least two high lift pumps must be provided with each pump designed to deliver a minimum of the design maximum day at the desired head.

5.2 Where fire protection is to be provided via the communal water supply/distribution facility, a third high lift pump (fire pump) shall be provided and the capacity of that pump shall be at least 16.6 L/s.

5.3 In many instances, it may be desirable to provide a third domestic high lift pump with this pump sized to meet a lesser flow rate than the maximum day requirement of the service area. In such instances, this domestic pump (lead high lift pump) should be designed to deliver the average daily flow for the service area.

5.4 In instances where the service area is not provided with an elevated storage tank and a ground storage reservoir located at the site of the treatment facility is the only storage provided, it will be necessary to provide pump(s) sized for the peak domestic demands.

5.5 During normal periods of domestic demand the smaller (average day pump) if provided, will provide an adequate supply of water, while the larger pumps (i.e., maximum day and/ or peak hour) will only operate to accommodate higher demands or in the event of failure of the lead (domestic) pump.

5.6 In instances where the storage for the system is in the form of a ground storage reservoir located

adjacent to the source of supply, pump operations shall be controlled by pressure switches. Pressure regulation in the distribution system shall be accomplished by pressure regulating valves with pressure relief to the storage reservoir under low demand conditions. In many instances, it may be advisable to provide pressure tanks/cushioned tanks for pump control in order to minimize the number of start/stop cycles and hence, wear and tear on the pumping equipment.

5.7 Minimum system pressure of the highest point in the distribution system shall be 275 kPa under peak hour conditions. During periods of fire demand, the pressure in the distribution system should not fall below 140 kPa. The maximum pressure in the distribution system should not exceed 690 kPa.

6.0 ELECTRICAL EQUIPMENT

6.1 The preferred power supply to all water works is a three phase 550 volt source. Should this preferred source of power supply be unavailable for the proposed works, an acceptable alternate would be from a bank of three single phase distribution transformers with secondaries delta connected and ungrounded. Two transformers connected open delta are unacceptable.

6.2 All electric motors over 0.37 kW should be 575 volts, three phase, 60 hz. Motors should be provided with drip proof totally enclosed or submersible enclosures and the motor should be 2 CEMA standard MG-1 and be CSA approved.

6.3 Overload protection should be provided on each phase. All motor starters are to be combination type molded case breaker. Breakers should be equipped with adjustable magnitude trip only, (i.e., MCP type). Reduced voltage starters should be provided on all motors over 15 kW. Where 120 volt control is required with 575 volt starter, each starter should include an integral control transformer with a fused secondary.

6.4 All electrical apparatus should be located in an accessible location above grade with a clear access of 1.0 metres around all pumps and motors. This equipment should be mounted on a concrete base at least 150 mm above the floor level. Electrical conduit to the specifications of the electrical inspector should be used throughout the pumphouse. All panels and controls should be moisture resistant.

6.5 Heating of the pumphouse(s) should be by electrical unit heaters with individual built in thermostats. These heaters should be located within 1.0 m of the floor or be equipped with the appropriate fans and ducting to direct the heat to the floor area.

6.6 Fluorescent lighting should be provided in all pumphouses and should be located within 2.5 m of the floor in order to facilitate replacement of the fixture and/or tubes.

6.7 A single outside vandal proof light should be provided adjacent to or over the access door to the pumphouse(s). This light should be activated either by a photo electric cell or a timer.

6.8 A weather proof switch and electrical outlet should be provided inside the pumphouse immediately adjacent to the access door.

6.9 Lightning arresters should be provided at the 600 volt terminals at the hydro terminal pole.

6.10 In the case of a groundwater supply where one or more of the production wells is located external to the primary pumphouse, a lock out disconnect switch should be provided for each pump unit and these switches should be located within sight of the pump unit for which it is installed.

6.11 Standby power may be required at the supply and/or the high lift pumping facilities. To facilitate the assessment of the need for standby power by the Ministry, the following form should be completed.

INFORMATION REQUIRED FOR WATER PUMPING STATION APPLICATIONS

In order to assess the need for standby power at pumping stations, it is necessary to know details of the power supply to the pumping station(s). Complete the following questionnaire and submit it along with the application for approval.

A. ELECTRICAL POWER SUPPLY

i) The name of the operating authority of the power system at the point where the pumping station is tied in is _____.

ii) The number of power feeder lines supplying the grid operated by this authority is _____.

iii) The number of alternate routes possible within the power grid to supply the point of connection is _____.

iv) The number of alternate transformers through which power could be directed to power the pumping station in the event of failure of the major feed is _____.

v) Is the service above ground? _____.

vi) List the power abnormalities including power surges and drops during the past 5 years for the area of the pumping station.

Date	Duration	Reason for Abnormality

B. PUMPING STATION

i) The operating authority responsible for maintenance and operation of this pumping station is _____.

ii) The power failure alarm is set up to relay a signal to _____.

iii) The pumping station control _____ ("is" or "is not") equipped to automaticlaly re-start pumps in the event of their shutting down during power fluctuations and outages.

iv) Where the system is provided with elevated storage, the usable volume will provide _____ hours supply at average daily demand.

7.0 CONTROLS, INSTRUMENTATION AND METERING

7.1 The following controls shall be provided between the storage reservoir and the high lift and low lift pumping equipment:

(a) A low level cut-off to shut-off the high lift and fire pumping equipment when the water level in the reservoir drops to a pre-determined low level.

(b) A high level cut-off the shut down the low lift pumps when the water level in the reservoir has reached a pre-determined high level.

(c) Level sensors to operate the low lift pumps sequentially.

Note: Mercury switches should not be used in potable water systems.

7.2 Pressure switches shall be mounted on the discharge line from the high lift pumping station to operate the high lift pumping equipment sequentially. It is suggested that system pressure be maintained at 400 - 450 kPa utilizing the smaller of the high lift pumping units, with additional pumping units being called on when the demand/pressure drop dictates. Suggested call-on points are 340 kPa for the additional domestic flow pumps and 240 kPa for the fire pump. The maximum system pressure should not exceed 690 kPa.

7.3 A pressure gauge should be installed on the discharge of the high lift pumps.

7.4 Elapsed time meters should be provided for all high lift pumps.

7.5 Output from the high lift pumping station to the distribution system shall be metered with a recording type flowmeter calibrated in metric units. The recording device should be an electrically driven unit with a 7-day circular chart.

7.6 The start-stop operation of the fire pump should be arranged between the municipality and the local fire officials. Indication of the operation status of the pump should be relayed to an answering service or a central operating point where 24-hour surveillance is provided.

8.0 PUMPHOUSES

8.1 PUMPHOUSE - GENERAL

8.1.1 For each water supply installation, a suitable pumphouse of concrete block, pre-painted steel, or other suitable building material should be constructed. In all cases, the pumphouse should conform to local building and zoning by-laws as well as Ministry of Labour regulations. The size of the building should be such that all equipment is accessible for maintenance. A minimum 5.0 m^2 should be provided for the storage of chemicals. Building insulation should be in accordance with the Ontario Building Code.

8.1.2 If a frameless steel building is to be constructed, provision should be made to support wall-mounted equipment. This can be accomplished by providing a sub-frame suitably anchored to the concrete floor during initial construction. The exterior finish of steel buildings should be factory applied and baked prior to delivery. Should the steel building be of prefabricated, pre-insulated sections, the interior surface should be factory-coated and baked prior to delivery.

8.1.3 To discourage vandalism, no windows should be provided in pumping stations. In addition, all building locks should be of the flush-mounted type, deadbolt, and jimmy-proof. Keying arrangements should be as specified by the owner/operator. Heavy-duty type steel intake and exhaust louvres should be provided to minimize the potential for damage by vandals.

8.1.4 Ventilation of the pumphouses should be accomplished via an exhaust fan operated by a thermostat with a manual override switch. The exhaust outlet should be located on a wall near the ceiling, with inlet louvres located near the floor on the opposite side of the building. The inlet louvres should be controlled to open when the exhaust fan is operating, and to close when the fan is off. The exhaust fan should have sufficient capacity to provide 5-6 air changes per hour. The inlet louvres should be shrouded or otherwise protected from snow etc.

8.1.5 Raw and treated water sampling taps should be provided on the discharge lines from the low lift and high lift pumps. Treated water taps should be located at a sufficient downstream distance from chemical applications points to ensure that complete mixing has taken place prior to the withdrawal of the samples.

8.1.6 All high lift pumps, motors, and cushion tanks should be placed on concrete bases at least 150 mm above the floor.

8.1.7 The building floor should be a minimum 300 mm above the external ground surface and/or any potential flood level. Pumphouse floors should be poured reinforced concrete and sloped towards the access door. Concrete floor slabs and pump bases should be sleeved from the pump shafts on vertical turbine pumps.

8.1.8 A fire extinguisher, Type ABC, should be provided in each building.

8.1.9 All interior and exterior wall surfaces, doors and trims should be painted to a colour scheme as approved by the owner/operator.

8.2 PUMPHOUSE - WELL PUMPING STATIONS

8.2.1 A hatch with minimum dimensions of 800 mm x 900 mm size should be provided in the roof of all well pumphouses directly over the well situated therein. The hatch may, if desired, be a removable type skylight unit. To allow for pump removal, the well should be positioned from 600 - 1200 mm from the outside of the wall, and be adjacent to an access road designed for heavy vehicle access. Double entrance doors should be provided, should open outwards, and should be sized such that they are wider than the largest piece of equipment in the pumphouse.

8.2.2 The elevation at the top of the well casing should be above the existing ground surface, the normal flood level of any adjacent water body, and at lest 0.15 m above the finished floor level of the pumphouse.

8.2.3 A pump pedestal, raised at least 0.15 m above the finished floor elevation, should be provided to support the full weight of the pump.

The weight of the well pump and its discharge assembly should not be borne by the well casing. Rather, this weight must be borne by the pump base and reinforced concrete floor slab.

8.2.4 The piping layout in the pumphouse should include an in-line free discharge pipe to the

outside of the building to permit future test pumping of the well. The end of the pipe should be equipped with a free discharge pipe orifice and manometer tap, calibrated to the design yield of the well. Details respecting this discharge piping can be obtained from the Water Resources Branch - Drinking Water Section.

8.2.5 A combination flow control and check valve, calibrated to the design yield of the well, should be positioned in the well pump discharge header in advance of the free discharge pipe.

8.2.6 A digital flowmeter and recorder should be provided in the well pump discharge header in advance of the free discharge pipe.

8.2.7 Pressure gauges should be installed upstream and downstream of the flow controller.

8.2.8 A watertight seal should be provided between the pump base or submersible discharge header and the pump pedestal, or between the well casing and the pump discharge column.

8.2.9 Auxiliary openings, at least 25 mm in diameter, should be provided in the pump base, submersible discharge header, or well seal as required, to provide vertical access to the inner well casing for an electric sounder and the installation of accessory equipment.

8.2.10 The well should be equipped with an air vent. It should be vented to the outside of the building if explosive or toxic quantities of gas are present and the auxiliary holes sealed.

8.2.11 The well should be equipped with a water level measuring air line. The air line should be clamped to the pump column, provided with a direct reading pressure gauge in metres, and calibrated to the water level in the well.

8.2.12 At no time during the equipping and testing of the well pump is the rate of pumping to exceed the design yield of the well. Overpumping of a well can adversely affect the well's development and can result in decreased well efficiency and/or the pumping of sand from the well.

8.2.13 Appendix T contains "Criteria for Pumping Tests for Small Communal Groundwater Supplies" and should be referenced for guidance in development and contracting of small groundwater sources.

9.0 WATER SUPPLY PROPERTY AND ACCESS REQUIREMENTS

9.1 It is the preference of the Ministry that all property, structures, distribution system piping, and appurtenances associated with the water supply, storage distribution works be deeded to the municipality.

9.2 Actual property requirements should be negotiated prior to approval of the water supply system by the municipality. Property requirements will vary, but as a minimum, access for large service vehicles should be provided for, and space for temporary holding lagoons which will be required for acid waste waters during well maintenance.

9.3 All property associated with above-surface structures should be fenced with a chain link security fence at least 1.8 m high. The fencing material should be #9 gauge, 50 x 50 steel chain link wire fencing, galvanized following fabrication. A 3.6 m gate should be provided for vehicular access.

9.4 Access roads should be provided to each pumphouse, well head, and reservoir. These roads should be designed and constructed for year-round use.

9.5 Overhead electrical wires and the location of transformers must be situated in such a way as not to interfere with the operation of crane equipment over a well pumphouse or well heads.

10. WATER TREATMENT REQUIREMENTS

10.1 Water for drinking, culinary and other domestic uses should be safe, palatable and aesthetically appealing. It should be free from pathogenic organisms, hazardous levels of chemical and radioactive substances. Other aspects, such as corrosivity, tendency to form incrustations, and excessive soap consumption due to hardness should be controlled on the basis of economic considerations as they can interfere with the intended domestic use of the water.

10.2 Ministry of the Environment Policy 15-06 of the Manual of the Environmental Policies and Guidelines deals with drinking water quality in Ontario. The policy applies to water works operated by the municipalities and others as covered under the provisions of Section 23 of the Ontario Water Resources Act. The main function of these works is to ensure that all surface and groundwater sources produce a potable water.

10.3 The Ministry's "Treatment Requirements for Municipal and Communal Waterworks Using Surface Water Sources" and "Treatment Requirements for Municipal and Communal Waterworks Using Groundwater Sources" are the Ministry's formal policies respecting these subjects. In essence it is required that all waterworks shall have acceptable source protection and treatment processes to ensure that the potable water produce meets the intent and limits set out in the "Ontario Drinking Water Objectives.

10.4 The proponent of any water supply facility, whether the source be surface or groundwater, should

familiarize himself with the requirements of these policies and the Ontario Drinking Water Objectives in order to ensure that the proposed works comply with their requirements. Copies of these materials are available from the Ministry's District, Regional and Head Office, Water Resources Branch.

10.5 Disinfection of communal water supplies shall be in accordance with the Ministry's publication entitled "Chlorination of Portable Water Supplies-Bulletin 65-W-4".

11.0 WATER SYSTEM OPERATION

11.1 While recognizing that operation of communal water supply and treatment systems should be performed by municipal personnel, it is realized that in the interest of economy and security, operation of remote systems can be accomplished with on-site personnel retained on contractual basis. In the case of a privately operated water supply and treatment facility it should be clearly outlined in the agreement as to which method of operation is to be undertaken with appropriate clauses outlining "safe harmless" agreements, insurance coverages, leveling of water rates, and the possible takeover of operations by municipal personnel on default.

11.2 If the new water supply system is to be contractually operated, the municipality should levy on the private operator a yearly inspection fee to defray the cost of routine inspections by municipal personnel.

11.3 In the case of privately owned and operated facilities it should be understood that all capital costs of system construction should be recovered through the sale of lots and revenues obtained from the sale of water should only cover operating, maintenance and collection costs.

11.4 An operating manual must be prepared and turned over to the municipality. This manual must contain at least the following:

a) as constructed civil, mechanical and electrical drawings.

b) As constructed building and laboratory details.

c) As constructed distribution system drawings.

d) Pump literature, pump curves and operating instructions.

e) Operating and maintenance instructions for all equipment.

f) Names, addresses and telephone numbers of all equipment suppliers and installers.

g) Information on guarantees/warranties for all equipment.

h) The name, address and telephone number of the designer.

i) The name, address and telephone number of the nearest Ministry of the Environment and Ministry of Health offices as well as the municipal officials.

12.0 DOMESTIC WATER METERING AND WATER SERVICES

12.1 It is well known that the use of domestic water meters is effective control of wasteful water use. A municipality should therefore strongly consider the installation of water meters in all new homes being served with a communal water supply. To reduce costs of meter reading, readout devices should be placed near the hydro and/or gas meter at the time of water meter installation.

12.2 A metered water rate with appropriate service charges, if required, should be established to provide revenue for the costs associated with the operation, maintenance and collection based upon anticipated consumption patterns. The rate should also allow for a contingency fund to cover future repairs, maintenance, upgrading etc.

12.3 The minimum water service size shall be NPS-3/4. The local municipality however may direct a larger service to be installed under the following conditions:

a) Larger homes for larger instantaneous water demands can be expected (e.g. estate type development).

b) A length of service lateral is in excess of 30 meters.

c) The pressure in the distribution system is low.

12.4 The municipalities shall designate the materials to be used in the installation of service connections.